

# COMPARISON OF THE EFFECTIVENESS OF NUTRITION COUNSELING WITH COGNITIVE BEHAVIOR THERAPY METHODS AND STANDARDIZED NUTRITION COUNSELING ON PATIENTS' FOOD WASTE AND BLOOD SUGAR LEVELS IN DIABETES MELLITUS PATIENTS

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## Keywords:

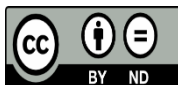
Nutritional Counseling, Cognitive Behavior Therapy, Food Waste, Blood Sugar Levels, Diabetes Mellitus.

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## ABSTRACT

This study aims to determine the effectiveness of Nutrition Counseling with the CBT (Cognitive Behavior Therapy) Method on food waste and blood sugar levels compared to standardized nutrition consultations for DM patients at RSU Islam Klaten. This research is a quasi-experimental study with a cross-sectional approach and a pretest-posttest control group design. The sample of this research was 45 respondents who were divided into three groups, namely the nutrition counseling group using the CBT method, the standardized nutrition counseling group, and the control group. The data analysis test used the Mann Whitney test and the Wilcoxon test because the data were not normally distributed. The research results show nutritional counseling with the CBT method has a significant effect on the patient's food waste. This is evidenced by the results of the different tests before and after the CBT treatment showing a p value of 0.001, and the results of the different tests between groups, both in the CBT method nutrition counseling group compared to standardized nutrition counseling and in the CBT method nutrition counseling group compared to the control group, there was a significant difference with p values of 0.013 and 0.000 respectively less than 0.005.

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## 1. Introduction

Nutrition services at the hospital for inpatients include standardized nutritional care and provision of dietary food as needed. Fulfillment of nutrition for inpatients is the responsibility of the Nutrition Installation. Hospital food is an integral component of the care provided to inpatients and facilitates patient recovery [1]. Hospital food service is recognized as an important element in determining the patient's overall perception of the hospital experience. Providing hospital food services that exceed patient expectations will increase

patient confidence in hospital food [2].

Hospital food is also an example of healthy and nutritious food that is adapted to the patient's health condition [3]. The condition of a patient who is weak due to failure to fulfill their nutritional needs in the hospital will be exacerbated if the patient suffers from a disease that requires nutritional therapy such as diabetes mellitus [4].

The results of the 2018 Riskesdas show that the prevalence of diabetes mellitus (DM) in Indonesia according to a doctor's diagnosis at the age of more than 15 years is 2%. This figure shows an increase compared to the prevalence of diabetes mellitus in the 2013 Riskesdas results, which was 1.5%. In addition, the prevalence of diabetes mellitus based on blood sugar examination results showed an increase from 6.9% in 2013 to 8.5% in 2018. This figure shows that only around 25% of people with diabetes mellitus are aware that they have diabetes mellitus [5].

Setting a diet by adjusting the conditions of calorie needs needed for people with diabetes mellitus is an effort to prevent and control diabetes mellitus. Thus, nutrition services for patients with diabetes mellitus are very important because dietary control is the key to controlling blood glucose levels [4]. Therefore, ensuring DM patients consume all the food served by the hospital can help patients meet their nutritional needs with the role of a nutritionist at the hospital who has arranged the patient's diet according to the type and condition of the disease.

Food waste is an indicator that can be used to measure the success of the food delivery system in hospitals [6]. Because food waste for patients that exceeds the 20% standard indicates the failure of the hospital to provide food services for patients. Hospital food waste can be defined as the amount of food served by inpatients that is not eaten [7]. Data on food waste is generally used to evaluate the effectiveness of organizing and serving food in hospitals.

Initial observations at the Klaten Islamic General Hospital (RSU Islam Klaten) showed that food waste in diabetes mellitus (DM) patients was greater than other inpatients at the hospital. According to the results of interviews with several patients regarding the patient's food waste, they stated that the food served by the hospital did not suit their taste, the patient also did not know that the nutritional intake contained in the food served by the hospital was beneficial for recovering the patient's physical condition, not always intake nutrition given according to the patient's taste.

Good nutrition management can reduce and prevent complications and death associated with diabetes mellitus. However, most patients living with diabetes do not carry out optimal nutritional management of diabetes because they see it as the most difficult aspect of managing the condition [8]. So that many diabetes mellitus patients who are treated in hospitals do not want to accept the food intake provided by the hospital so that a lot of food waste from diabetes mellitus patients are wasted as mentioned from several previous studies above. This will certainly affect blood sugar levels in patients with diabetes mellitus.

Patient behavior in controlling blood sugar levels with diet can be improved with counseling. One of the counseling methods that can be applied is the CBT (Cognitive Behavior Therapy) Method. Nutrition counseling with the CBT method is a form of counseling that has the goal of helping clients to be healthier, to have a satisfying experience, and to be able to fulfill certain lifestyles, by modifying certain mindsets and behaviors of patients [9].

In this CBT therapy, counselors work with patients to identify and change thought patterns and behaviors that cause physical or emotional disturbances to non-adherence to diet. The focus in this therapy is to change the patient's mind to commit to the diet that must be followed, self-motivation appears for better changes, according to research results of Dewi & Triseptinora that self-motivation is the most influential psychosocial factor on dietary behavior changes. This technique is rarely used in other hospitals/health facilities to reduce food waste and control blood sugar levels in DM patients, if this technique is proven effective in changing patient adherence seen from the patient's food waste, it is necessary to develop further for the development of nutritional counseling services in other health facilities in order to improve the standard of living of patients after returning from health services [10].

Based on the explanation above, nutritionists need to carry out nutritional counseling using the CBT method in more depth in order to increase self-knowledge and motivation regarding the diet that must be followed so that patients do not waste food given to them by the hospital. The success of the program can be monitored from the results of laboratory tests, where blood sugar levels are monitored to be stable.

## **2. RESEARCH METHODS**

### ***2.1 Types and Research Design***

This study uses a type of quantitative research with a quasi-experimental research design, namely experimental research that gives exposure is not done randomly. The approach used in this study was cross sectional, namely a research approach by measuring and observing at the same time, or examining exposure status and disease status at the same point [11].

The research design used was the Pretest-Posttest Control Group Design. In this design, there are two groups that are randomly selected, then given a pretest to find out whether there is a difference in the initial state between the experimental group and the control group. The pretest results are good if the experimental group scores are not significantly different [12].

### ***2.2 Population and Sample***

The population in this study were all Diabetes Mellitus patients who were being treated at RSU Islam Klaten in class II and III and received food service from the hospital (nutrition installation). The sample for this study was 45 respondents, with details of 15 respondents for the group given nutrition counseling using the CBT method, 15 respondents for the group given standardized nutrition counseling, and 15 respondents for the control group.

Sampling was carried out by initial screening according to the inclusion criteria, followed by a simple random sampling system. The sample criteria were divided into two, namely: 1) Inclusion criteria: a) Inpatients with indications for special diets (DM Diet) who do not experience gastrointestinal problems, b) Patients have received nutritional counseling beforehand, c) Patients can communicate well, have the ability remember the good and be willing as a sample. 2) Exclusion criteria: a) Patients with complications such as kidney failure and hypertension, b) DM patients go home before the study ends, c) DM patients die before the study ends.

### ***2.3 Variables and Operational Definitions of Variables***

Food waste are leftover food in one portion of food provided by the hospital, which the patient does not eat, which is calculated based on observations using the comstock method. The score for the patient's food waste includes: score 0 (if no portion of food waste (100% consumed), 1 (if portion remains or only 75%

consumed), 2 (if portion remains or only 50% consumed), 3 (If the remaining portion or only 25% is consumed), 4 (If the remaining is almost intact or only consumed a little or 5%), and 5 (If the food is not consumed at all or is whole). Food waste is divided into two, namely: Little (food waste <25%) and lots (food waste > 25%).

Blood sugar level is the amount of glucose circulating in the blood. Blood sugar levels were measured using a GlucoDR glucometer. The unit for measuring blood sugar levels is mg/DL (fasting blood sugar). The measurement results were divided into three categories, namely Diabetes (blood sugar level > 126), Prediabetes (blood sugar level 100-125), and Normal (blood sugar level <100).

#### **2.4 Data Analysis**

Univariate analysis was performed to determine the characteristics of the data. Data is described in terms of mean, standard deviation, minimum and maximum. Categorical data is described in percent form. The data presented in this analysis is in the form of tables or graphs. The bivariate analysis used to assess the effectiveness of the CBT nutritional counseling method used the paired samples t test. The effectiveness test used the results of the questionnaire before and after the CBT method of nutritional counseling was carried out in each group. If the data is not normally distributed, the test used is the Wilcoxon test.

Bivariate test to determine differences in nutritional counseling between the control and treatment groups using the SPSS 25 for Windows application using an independent t test, with a confidence level of 95% ( $\alpha = 0.05$ ). If the data is not normally distributed, the test used is the Mann Whitney test.

### **3. RESULTS**

#### **3.1 Univariate Analysis**

The frequency distribution of respondent characteristics based on gender and age of patients in groups I, II and III can be seen in table 1 below:

**Table 1** Frequency Distribution of Respondent Characteristics of Diabetes Mellitus Patients at RSU Islam Klaten

Characteristics	Group (n=45)			Total (%)
	I $\Sigma$ (%)	II $\Sigma$ (%)	III $\Sigma$ (%)	
Gender				
Man	8 (53,33)	8 (53,33)	6 (40)	22 (48,89)
Woman	7 (46,67)	7 (46,67)	9 (60)	23 (51,11)
Age				
21-30 years	0 (0)	1 (6,67)	0 (0)	1 (2,22)
31-40 years	0 (0)	0 (0)	0 (0)	0 (0)
41-50 years	3 (20)	2 (13,33)	3 (20)	8 (17,78)
51-60 years	6 (40)	5 (33,33)	4 (26,67)	15 (33,33)
61-70 years	3 (20)	6 (40)	6 (40)	15 (33,33)
71-80 years	3 (20)	1 (6,67)	2 (13,33)	6 (13,33)

I: (Nutrition Counseling Treatment with CBT (Cognitive Behavior Therapy) Method), II: (Standardized Nutrition Counseling Treatment, III: (control)

Based on table 1. about the frequency distribution based on the characteristics of the respondents of Diabetes Mellitus patients, it was found that the sex of the respondents was dominated by women, namely

51.11%, and the age of the respondents was dominated in the age range 51-60 years and 61-70 years respectively 33.33%.

The frequency distribution based on the food waste of the respondents in groups I, II & III can be seen in table 2 below

**Table 2** Frequency Distribution of Respondents based on Food waste in Diabetes Mellitus Patients at RSU Islam Klaten

Food waste	Group (n=45)			Total (%)
	I Σ (%)	II Σ (%)	III Σ (%)	
<b>Before Treatment</b>				
Little	3 (20)	2 (13,3)	5 (33.3)	10 (22,2)
Lots	12 (80)	13 (86.7)	10 (66.7)	35 (77.8)

<b>After Treatment</b>				
Little	15 (100)	10 (66.7)	7 (46.7)	32 (71.1)
Lots	0 (0)	5 (33.3)	8 (53.3)	13 (28.9)

I: (Nutrition Counseling Treatment with CBT (Cognitive Behavior Therapy) Method),  
II: (Standardized Nutrition Counseling Treatment, III: (control)

Based on table 2 about the frequency distribution of respondents based on food waste in patients, it was found that prior to treatment, the food waste in groups I, II, and III were dominated by a lot of food waste. After the treatment of groups I and II were dominated by a little food waste, group III was dominated by a lot of food waste.

**Table 3** Frequency Distribution Based on Respondents' Blood Sugar Levels at RSU Islam Klaten at RSU Islam Klaten

Blood Sugar Levels	Group (n=45)			Total (%)
	I Σ (%)	II Σ (%)	III Σ (%)	
<b>Before Treatment</b>				
Diabetes	15 (100)	15 (100)	14 (93.3)	44 (97.8)
Prediabetes	0 (0)	0 (0)	1(6,7)	1(2,2)
Normal	0 (0)	0 (0)	0 (0)	0 (0)
<b>After Treatment</b>				
Diabetes	0 (0)	12 (80)	13 (86.7)	26 (57.8)
Prediabetes	6 (40)	2 (13,3)	2 (13,3)	9 (20)
Normal	9 (60)	1(6,7)	0 (0)	10 (22,2)

I: (Nutrition Counseling Treatment with CBT (Cognitive Behavior Therapy) Method),  
II: (Standardized Nutrition Counseling Treatment), III: (control)

Based on table 3 regarding the frequency distribution based on the blood sugar levels of the respondents, it was found that before the treatment the blood sugar levels of the respondents in groups I, II & III were dominated by the diabetes category. After treatment, group I was dominated by the normal category, groups II and III were dominated by the diabetes category.

### 3.2 Bivariate Analysis

Effect of nutritional counseling with the CBT method on food waste and blood sugar level in groups I, II & III can be seen in table 4. below.

**Table 4** Differences in Results of Measuring the Effect of Nutrition Counseling with the CBT (Cognitive Behavior Therapy) Method on Food waste and Blood Sugar Levels in Diabetes Mellitus Patients at RSU

Group	Islam Klaten			
	Mean ± SD	Z	95% CI	<i>p-value</i>
<b>Food waste</b>				
Group I	54.67±25.76	-3,408	40.40 – 68.93	0.001
Group II	37.92±26.30	-3,351	23.36 – 52.48	0.001
Group III	7.50±18.05	-2,343	-2.49 – 17.50	0.019
<b>Blood sugar levels</b>				
Group I	235.80±104.66	-3,408	177.84 – 293.76	0.001
Group II	119.73±105.48	-3,181	61.32 – 178.45	0.004
Group III	40.87±50.00	-2,642	13.18 – 68.56	0.008

I: (Nutrition Counseling Treatment with CBT (Cognitive Behavior Therapy) Method),

II: (Standardized Nutrition Counseling Treatment, III: (control)

Based on table 4 regarding the effect of nutritional counseling using the CBT method on food waste and blood sugar levels, it was found that group I had a *p* value <0.05, which means that Nutrition Counseling with the CBT method had a significant effect on food waste (0.001) and sugar levels blood (0.001), in group II had a *p* value <0.05 which means that standardized nutrition counseling had a significant effect on food waste (0.001) and blood sugar levels (0.004), while in group III it had a *p* value <0.05 which means that the control group has a significant effect on food waste (0.019) and blood sugar levels (0.008).

**Table 5** Differences in Measurement Results Between Groups Effect of Nutrition Counseling with the CBT (Cognitive Behavior Therapy) Method on Food waste and Blood Sugar Levels in Diabetes Mellitus Patients at RSU Islam Klaten

Group	Mean ± SD	Z	95% CI	<i>p-value</i>
<b>Food waste</b>				
Group I & II				
Before Treatment	48.72 (24.59)	-0.560	-16.96 – 23.15	0.595
After Treatment	15.35 (16.35)	-2,537	-25.68 – -1.62	0.013
Group I & III				
Before Treatment	48.72 (24.59)	-2,967	4.03 – 44.14	0.003
After Treatment	15.35 (16.35)	-3,604	-35.11 – -11.05	0.000
Group II & III				
Before Treatment	48.72 (24.59)	-2,531	0.93 – 41.04	0.011
After Treatment	15.35 (16.35)	-1.479	-21.46 – 2.60	0.139
<b>Blood sugar levels</b>				
Group I & II				
Before Treatment	313.33 (113.89)	-1.514	-46.50 – 154.90	0.137
After Treatment	181.20 (102.88)	-4.025	-117.87 – -5.86	0.000
Group I & III				
Before Treatment	313.33 (113.89)	-0.021	-100.90 – 100.50	0.983
After Treatment	181.20 (102.88)	-4,481	-251.14 – -139.13	0.000
Group II & III				
Before Treatment	313.33 (113.89)	-1,224	-155.10 – 46.30	0.221
After Treatment	181.20 (102.88)	-3,629	-189.27 – -77.26	0.000

Based on table 5 regarding the differences in the results of measuring the effect of Nutrition Counseling with the CBT (Cognitive Behavior Therapy) Method on food waste between groups I & II, I & III, II & III obtained the result is that between groups I & II before treatment have a *p* value > 0.05 which means that there is no difference in food waste between groups, while between groups I & III and between groups II &

III before treatment have a p value < 0.05 which means that there are differences in the food waste between groups. After treatment, between groups I & II and between groups I & III had a p value <0.05 which meant that there were differences in food waste between groups, while between groups II & III had a p value > 0.05 which meant that there was no differences in the food waste between groups.

Results of measuring the effect of Nutrition Counseling with the CBT Method (*Cognitive Behavior Therapy*) on blood sugar levels between group I & group II, group I & group III, and group II & group III before treatment obtained a p value > 0.05 which means that there was no difference in the value of blood sugar levels between groups. Whereas after treatment, between groups I & group II, group I & group III, and group II & Group III showed a p value <0.05 which means that there were differences in blood sugar levels between groups.

The results of the selection logistic regression test on the factors that affect food waste and blood sugar levels in Diabetes Mellitus patients can be seen in table 6.

**Table 6** Results of Bivariate Selection Logistic Regression Test Factors Affecting Food Waste and Blood Sugar Levels of Diabetes Mellitus Patient at RSU Islam Klaten

Variable	Food waste		p-value
	Little	Lots	
<b>Gender</b>			
Woman	13 (40.6%)	10 (76.9%)	0.027
Man	19 (59.4%)	3 (23.1%)	
<b>Age</b>			
21-30 years	0 (0%)	1 (7.7%)	0.075*
41-50 years	8 (25.0%)	0 (0%)	
51-60 years	12 (37.5%)	3 (23.1%)	
61-70 years	9 (28.1%)	6 (46.2%)	
71-80 years	3 (9.4%)	3 (23.1%)	

Variable	Blood Sugar Levels			p-value
	Normal	PreDiabetes	Diabetes	
<b>Gender</b>				
Woman	6 (60.0%)	4 (44.4%)	13 (50.0%)	0783*
Man	4 (40.0%)	5 (55.6%)	13 (50.0%)	
<b>Age</b>				
21-30 years	1 (10.0%)	0 (0%)	0 (0%)	0.287*
41-50 years	1 (10.0%)	2 (22.2%)	5 (19.2%)	
51-60 years	6 (60.0%)	2 (22.2%)	7 (26.9%)	
61-70 years	1 (10.0%)	3 (33.3%)	11 (42.3)	
71-80 years	1 (10.0%)	2 (22.2%)	3 (11.5%)	

\*does not enter the next modeling

Based on table 6 above regarding the bivariate selection logistic regression test the factors that affect food waste Diabetes Mellitus patient is known that gender has a p value <0.05, so it is included in the next multivariate model, while age has a p value > 0.05 so it is not included in the next multivariate model. Thus, gender has an effect on the food waste of Diabetes Mellitus patients, while age has no effect on the food waste of Diabetes Mellitus patients.

Furthermore, the selection of bivariate logistic regression test for factors that affect blood sugar levels in patients with Diabetes Mellitus is known that gender and age have a p value  $> 0.05$  so they are not included in the next multivariate model. Thus, gender and age have no effect on blood sugar levels in Diabetes Mellitus patients.

Based on table 6 above about bivariate selection logistic regression test influencing factors ability It is known that the variables that have a p value  $> 0.05$  are not included in the multivariate manufacturing model.

**Table 7** Results of Multivariate Modeling Factors Influence Food Waste of Diabetes Mellitus Patients at RSU Islam Klaten

Variable	B	Wald	<i>p.s</i>	OR	95% CI
<b>Food waste</b>					
Gender	1,583	4,454	0.035	4,872	1.120 – 21.199

Based on the results in table 7 above, the related variables are obtained sea significant way to food waste is gender. The sex Odds Ratio (OR) value is 4.872. In this case, it means that patients with female sex have a tendency to eat a lot of food waste by 4.872 times than patients with male sex.

## 4. DISCUSSION

### *4.1 Description of Food waste in Diabetes Mellitus Patients at RSU Islam Klaten*

Diabetes Mellitus patients generally have complex problems and require holistic fulfillment. This is closely related to the motivation and optimal food intake of Diabetes Mellitus patients to maintain optimal quality of life. Food waste in this study refer to the theory of food waste [13] which in this theory states that food waste are leftover uneaten food after being served to patients in the hospital.

Based on the results of the study it was found that food waste in Diabetes Mellitus patients at RSU Islam Klaten prior to treatment (intervention) in both groups I, II and III, were dominated by the category of large food waste. Seen in the frequency distribution of food waste, patients who had a lot of food waste were 35 patients (77.8%), while patients who had little food waste were 10 patients (22.2%).

The amount the patient's food waste in this study based on the results of interviews was caused because the food served by the hospital did not suit their taste, the patient also did not know that the nutritional intake contained in the food served by the hospital was beneficial for the recovery of the patient's physical condition, not forever. Nutritional intake is also given according to the patient's taste. The rest of the patient's meal is a factor that comes from external factors and environmental factors of the patient. Apart from that, the patient's internal factors also affect the rest of the patient's meal. This is as stated by [14]. Delivering food waste is influenced by internal, external and patient environmental factors. Internal factors are included in factors that come from within the patient himself, such as psychological, physical, and eating habits. External factors are factors that come from outside the patient, including the appearance of food and the taste of food. The last factor, namely environmental factors, includes the schedule/time for giving food, food from outside the hospital, cutlery and the friendliness of the food server/server.

Food waste is a complex matter with factors contributing to the system itself. These include the complexity of the clinical environment requiring multiple therapeutic diets, menu ordering systems with long delays between ordering and eating, food service models and hospital kitchen design that do not support high



quality food, use of portion control meals, and resource constraints. Individual factors associated with the patient also contribute to food waste. These include poor appetite, short length of stay, and the challenge of meeting patient satisfaction with the food and food service system [15].

Some or half of the respondents in this study 23 respondents (51.11%) were female. It turns out that female gender also affects the rest of the patient's meal. Based on research findings, patients with female sex tended to eat more with 10 respondents (76.9%) compared with men with 3 respondents (23.1). Also based on Odds Ratio Value (OR) gender on food waste of 4.872. In this case, it means that patients with female sex have a tendency to eat a lot of food waste by 4.872 times than patients with male sex. Thus according to the theory presented by [16] that one of the factors that affect the high residual food is gender. Most food scraps are found in women than men.

Research from [17], [18] also stated that women tend to waste more food than man. Reinforced by other research from [19] which states that food waste is more common in women for most meals. There is no clear reason why the female patient wasted more food other than to suggest that the female might be a bit more fussy about her food intake.

Related to the patient's age, the findings of this study turned out that age had no effect on the food waste the patient showed with the p value of 0.075 is more than 0.05. However, judging from the frequency distribution of patients who left a lot of food, there were 61-70 years old patients with 6 respondents (46.2%). This is as stated by [16] that several factors affect food waste, one of which is age. Most food scraps are found in people over 65 years of age or the elderly.

The elderly usually have constraints that affect eating behavior, such as physiological changes associated with aging. Loss of sensory capacity, difficulty chewing and other physical limitations usually interfere with food intake, contributing to food waste [7], [18], [20], [21]. In addition, psychological factors such as widowhood, depression, and loss of cognitive abilities can also affect food intake. Changes in feeding and routine modifications also affect food intake and elderly satisfaction. Inadequate portions, poor presentation of food, inadequate diet due to limited chewing and lack of assistance during eating were usually associated with higher food waste scores by the elderly [7], [18], [20- 22].

#### ***4.2 Description of Blood Sugar Levels in Diabetes Mellitus Patients at RSU Islam Klaten***

Diabetes Mellitus (DM), which is also known as urinary diseasesweetor blood sugar disease, is a group of chronic diseases characterized by an increase blood sugar levels, as a result of disturbances in the body's metabolic system, in which the pancreas is no longer able to produce the insulin hormone according to the body's needs. Insulin is one of the hormones produced by the pancreas which is responsible answer. To control the amount/level of sugar in the blood [23].

Based on the results of this study it is known that the level of blood sugar levels in Diabetes Mellitus patients at RSU Islam Klaten, prior to treatment was dominated by blood sugar levels in the diabetes category, namely 97.8%, and only 2.2% blood sugar levels in the prediabetes category. The high percentage of respondents who have blood sugar levels in this diabetes category is influenced by various factors.

Blood sugar levels are influenced by endogenous and exogenous factors. Endogenous factors, namely humoral factors such as the hormone insulin, glucagon, cortisol, receptor systems in muscle and liver cells. If the hormone insulin is less than needed, then blood sugar will accumulate in the blood circulation resulting in increased blood glucose. When blood sugar levels increase beyond the threshold of the kidneys,

blood glucose will be excreted with the urine. Exogenous factors include the type and amount of food consumed and physical activity done [24].

The results of the bivariate selection logistic regression test in this study showed that age had no effect on blood sugar levels as indicated by a p value of 0.287. However, the results of cross tabulation showed that 11 respondents (42.3%) were susceptible to having high blood sugar or diabetes aged 61-70 years. This finding is reinforced by the results of research from [26] who stated that diabetes was found to be high in the age group of 61-65 years with 65% followed by the age group of 51-55 years with 30.4%.

The more increase age, physical changes and decreased body function will affect the consumption and absorption of nutrients. Various studies have shown that nutritional problems in the elderly are mostly a problem of excess nutrition and overweight/obesity which lead to degenerative diseases including diabetes mellitus [27].

As we get older, some people lose more and more ability to regulate glucose levels as they did when they were young. This is confirmed by the results research from [28] which states diabetes and altered glucose metabolism usually occur with age. Oral glucose tolerance test (OGTT) can help characterize abnormal glucose status in the elderly population. Elderly aged 60 years and over have a prevalence of diabetes more than twice as compared to younger age groups. Blood glucose monitoring in elderly patients with diabetes is similar to that of younger adults. However, hemoglobin A1c can increase ~0.1% with each decade of age regardless of changes in blood glucose and has the potential to influence the interpretation of HbA1c in elderly patients.

The cross-tabulation results in this study showed that men and Woman have the same percentage in the level of blood sugar levels of 50% each. When compared with research from [29] concluded that men and women have the same pattern, but glucose levels are higher in men than women. This is contrary to the results of research from [30] which states that aging puts women at greater risk of increasing blood glucose levels, blood pressure, and blood cholesterol. The risk increases for older women with a high BMI.

[31] state that women are most affected by type 2 diabetes because they are less muscular which does not support high glucose uptake and have relatively high levels of estrogen and progesterone which are involved in reducing insulin sensitivity throughout the body.

#### ***4.3 The Effect of Nutrition Counseling with the CBT (Cognitive Behavior Therapy) Method on Food Waste in Diabetes Mellitus Patients at RSU Islam Klaten***

Nutrition counseling packaged in the form of Nutrition Counseling with the CBT (Cognitive Behavior Therapy) method needs to be applied to the concept of nursing with chronic illnesses. The condition of patients with chronic diseases often experience hopelessness in treatment, so the potential for non-adherence in the recommended program. Nutrition Counseling with the CBT (Cognitive Behavior Therapy) Method helps clients to be healthier, get a satisfying experience, and can fulfill a certain lifestyle, by modifying certain mindsets and behaviors of the patient [9].

Good nutrition management can reduce, prevent complications and death associated with diabetes mellitus. However, most patients living with diabetes do not carry out optimal nutritional management of diabetes because they see it as the most difficult aspect of managing the condition [8]. So that many diabetes mellitus patients who are treated in hospitals do not want to accept the food intake provided by the hospital so that a lot of food waste from diabetes mellitus patients are wasted. With nutritional counseling using the

CBT method, it is hoped that it can influence the patient's eating patterns so that they are receptive nutritional intake provided by the hospital so that food waste can be avoided.

Based on the results of this study it is known that Nutrition Counseling with the CBT (Cognitive Behavior Therapy) Method has a positive effect on food waste in Diabetes Mellitus. This is evidenced by an increase in the number in the frequency distribution table before & after the treatment. In addition, it was also proven by the probability value (p value)  $<0.050$  in the group that was given nutrition counseling treatment using the CBT method. From the results of different tests between groups, both in the CBT method nutrition counseling group compared to standardized nutrition counseling and in the CBT method nutrition counseling group compared to the control group, there was a significant difference with p values of 0.013 and 0.000 respectively less than 0.005.

The increase in food waste was due to the accuracy of the nutrition counseling method given during the study, which in this study, the researchers invited patients to learn to change behavior, calm mind and body so that you feel better, think more clearly and help you make the right decisions. In the end, it is hoped that CBT can help patients align their thoughts, feelings and actions so as to lead to consistency of thoughts and behavior in carrying out dietary guidelines. The dietary behavior of Diabetes Mellitus patients who are influenced by the application of the CBT (Cognitive Behavior Therapy) method has been unknowingly repressed in the subconscious so that patients can adjust their eating patterns according to the hospital's directions.

Findings research which states that nutritional counseling using the CBT (Cognitive Behavior Therapy) method has a positive effect on food waste in Diabetes Mellitus is in line with the results of research from [32]. The results of his research showed that there were differences in the eating patterns of type 2 DM patients before and after being given CBT.

[33] in his research revealed that cognitive behavioral therapy has a significant effect on increasing food consumption behavior. The advantage of CBT is that it treats several people at one time, more cost-effectively and, thus, potentially more accessible to the larger number of individuals who need assistance. In addition, patients enjoy the advantage of rapid treatment, which can increase the credibility of treatment and, as a consequence, increase their motivation for further changes.

The findings of this study were also strengthened by the results of the research submitted by [9] that after CBT counseling, patients can adjust their eating patterns and determine the portion of their meals that suit their needs. [34] explain in patient CBT counselling given education in practice gives attention to eating more appropriate foods, related to knowledge of its benefits, giving them clear reasons why they should eat in a more appropriate manner.

#### ***4.4 Effect of Nutrition Counseling with the CBT (Cognitive Behavior Therapy) Method on Blood Sugar Levels in Diabetes Mellitus Patients at RSU Islam Klaten***

Research shows that Diabetes Mellitus is considered a stressor for patients. Based on psychoneuroimmunology concept, the amygdala integrally sends information to the locus coeruleus which triggers the autonomic system which is then transmitted to the hypothalamus resulting in the secretion of corticotrophin releasing factor (CRF). In relation to blood sugar levels, in response to CRF, the anterior pituitary secretes adrenocorticotrophic hormone (ACTH) in the blood. ACTH is transported to the adrenal glands. ACTH stimulates the production of cortisol in the adrenal cortex. Cortisol is excreted in the bloodstream, causing an increase in blood sugar, fatty acids and amino acid levels [35].

Spencer & McEwen state in DM patients who experience impaired blood glucose regulation, either due to insulin deficiency or due to cell resistance to insulin, stressors (physical and emotional) that occur for a long time will affect the response of the HPA axis which produces cortisol. Cortisol has several functions, and one of the functions related to regulation of metabolism is to increase blood glucose levels by increasing gluconeogenesis and decreasing cell sensitivity to insulin, so that glucose uptake into cells decreases. This can worsen blood glucose levels in DM patients [36].

When individuals with these conditions get therapy, the brain will get optimal oxygen supply. Oxygen that fills all areas of the brain will circulate along with the heartbeat to be distributed to all organs of the body. This condition will help achieve the stability of the work of the glandadrenalsto produce calming hormones which will have an impact on reducing stress. This is in contrast to the impact of stress itself where under stressful conditions the blood sugar levels of DM patients will increase. If stress conditions can be controlled, the decrease in blood sugar levels can also decrease [37]. Therefore, to control the response to blood glucose regulation, positive perception modulation is needed. This positive perception will then induce the hypothalamus to secrete hormones that modulate the immune system. Modulation, in turn, results in lower HPA axis activity leading to lower cortisol levels. Decreased cortisol levels affect metabolism which reduces insulin resistance (increases blood glucose uptake into cells and tissues) and prevents glucogenesis. Therefore blood glucose levels are controlled [38].

Cognitive-behavioral psychotherapy (CBT) is one of the therapeutic techniques used in psychoneuroimmunology to create positive perceptions. In this therapy applied to psychoneuroimmunology, how to think about the immune response explained to that person. Various cognitive strategies have helped identify unhealthy beliefs that affect individual health conditions. In general, the therapeutic process that needs to be followed is: identify unhealthy beliefs, recognize the relationship between thoughts - emotions - behavior, examine evidence for or against thoughts, correct distorted thoughts, and replace cognitions with healthy beliefs [39]. With this therapy, it is hoped that DM patients can change their behavior so that patients want to adjust their diet, maintain blood sugar levels, and comply with the DM diet that has been implemented by the hospital.

Based on the research results, it is known that Nutrition Counseling with the CBT (Cognitive Behavior Therapy) Method can have an effect on the level of blood sugar levels in Diabetes Mellitus patients. This is evidenced by the increase which can be seen from the frequency distribution table before and after the treatment. Besides that, it is also proven by the p value  $<0,050$ . It can be seen that the p value in group I (nutrition counseling using the CBT method) is  $0.001 <0.50$  which indicates that there is a significant change in that group.

Results of measuring the effect of Nutrition Counseling with the CBT Method (Cognitive Behavior Therapy) on blood sugar levels between groups I & group II, as well as between groups I & group III after treatment showed a p value  $<0.05$  which means that there were differences in blood sugar levels between groups. It shows Nutrition Counseling with the CBT Method (Cognitive Behavior Therapy) has a significant effect on the patient's blood sugar levels.

The findings of this study are in line with the results of research from [9] which stated that there was an effect of CBT on blood glucose levels. Several studies have also shown that CBT reduces blood sugar levels in diabetes mellitus patients [33], [34], [40- 43]. The dietary behavior of type 2 DM patients is influenced by CBT which has been unconsciously repressed subconsciously so that patients can adjust their eating patterns and determine serving portions. eat according to their needs, this also affects their blood

glucose levels.

Decrease in the patient's blood sugar level on this research because they comply with the education given in the implementation of nutritional counseling with the CBT method. Several studies have shown the benefits of nutritional counseling with this CBT method. [41] deliver cognitive behavioral interventions in CBT helping patients with type 2 diabetes recover during or after treatment, and behavioral interventions in playing a major role in optimizing the immune system during this vulnerable period. In group CBT therapy sessions, changing maladaptive ways of thinking and feeling allows patients to pay attention, reinterpret pain, ignore pain, and talk to themselves. In behavioral practice, patients learn to increase activity. Several methods, such as modeling, eliciting successful experiences, and social reinforcement, are commonly used in HbA1C cognitive behavioral programs. It is therefore accepted that blood sugar HbA1C levels in people with type 2 diabetes decrease as a result of CBT therapy.

Nutrition counseling with the CBT method for diabetes mellitus patients helps identify barriers and challenges that individuals may face and explore what they need to overcome them. Diabetic patients can greatly benefit from the immediate support and repeated reinforcement provided by the intervention. CBT has been an effective treatment in improving depression. People with diabetes often experience comorbid depression, which can worsen their health condition. Therefore, the benefits of CBT can go beyond treating depression [44].

[34] explained that the decrease in blood sugar levels in members of the experimental group could be caused by several factors, one of which was an important educational component in CBT interventions. There has been a rapid increase in knowledge about diabetes, as members of the experimental group received informative notes on various aspects of diabetes at each therapy session, which they hoped to study and apply.

## 5. CONCLUSION

Based on the results of the research and discussion that have been submitted, several conclusions can be put forward as follows:

The characteristics of DM patients at RSU Islam Klaten showed that the sex of the respondents was dominated by women, namely 51.11%, and the age of the respondents was dominated in the age range 51-60 years and 61-70 years, respectively 33.33%.

The food waste of the DM patients at RSU Islam Klaten before treatment in groups I, II, and III were dominated by a lot of food waste. After the treatment, groups I and II were dominated by little food waste, and group III was dominated by lots of food waste.

Blood sugar levels of DM patients at RSU Islam Klaten before treatment in groups I, II & III were dominated by the diabetes category. After treatment, group I was dominated by the normal category, groups II and III were dominated by the diabetes category.

Nutrition Counseling with the CBT (Cognitive Behavior Therapy) Method has a significant effect on the patient's food waste. This is evidenced by the results of the different tests before and after the CBT treatment showing a p value of 0.001, and the results of the different tests between groups, both in the CBT method nutritional counseling group compared to standardized nutrition counseling and in the CBT method nutritional counseling group compared to the control group, there is a significant difference with p values are 0.013 and 0.000 respectively less than 0.005.

Nutrition Counseling with the CBT (Cognitive Behavior Therapy) Method has a significant effect on the patient's blood sugar levels. This is evidenced by the results of the different tests before and after the CBT treatment showing a p value of 0.001, and the results of the different tests between groups shows a p value of 0.000 less than 0.005.

Based on the conclusions above, several suggestions can be put forward as follows: 1) For Hospitals. Considering the results of this study, it is important to develop strategies to reduce food waste. A combined effort is required, consisting of involving employees involved in food preparation and distribution, as well as increasing patient awareness of food waste. In addition, it is important for each hospital to monitor their own food waste and identify effective strategies to increase nutritional intake for vulnerable patients. To encourage patient acceptance of food, it is advisable to standardize processes to ensure food quality. Satisfaction surveys may also be useful for evaluating DM patient satisfaction. The participation of DM patients in menu planning is also useful for encouraging menu adequacy. Risk of diabetes mellitus increase with age. To maintain normal blood sugar levels, risk factors must be controlled. Although aging is unavoidable, BMI levels can be managed by practicing a healthy lifestyle such as reducing the intake of fat, salt, and sugar in the diet, increasing physical activity, and maintain normal weight. 3) For further researchers. Future studies could focus on expanding the implementation of CBT programs to further test their effectiveness in more diverse populations in different geographic and medical settings. This will require larger-scale research. The aim of future studies could be to examine the effect of CBT on sustainable lifestyle changes and establish long-term follow-up.

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